Cubic Meter Model Assembly Instructions

Introduction:

The Cubic Meter Model is used in the GLOBE activity "Constructing a Model of Surface Ozone" found in the GLOBE Teacher's Guide as part of the Surface Ozone protocol. The complete activity can be found on the GLOBE website (http://www.globe.gov/tctg/modelppb.pdf?sectionId=27).

Parts List

Quantity	Description of Item	Part Number or Source
12	3/8-inch (approx 1-cm) wooden	Hardware or home-improvement stores,
	dowel sticks, shortened to 37 7/8-	usually found in 48" (120-cm) lengths
	inches (approx 94.8-cm)	
8	1-inch (approx 2.5-cm) wooden	Hardware or home-improvement stores,
	cubes (can be cut from 1-inch x 8-	1-inch poplar square is usually found in
	inch poplar square)	36-inch (approx 90-cm) lengths
52	3 1/4-inch (approx 8-cm) length 3/4-	Available in 15-foot (4.5-m) rolls at
	inch sticky-back hook-and-loop tape	hardware, home-improvement, craft, or
	(ex. Velcro)	office supply stores
20	1-inch (approx 2.5-cm) length 3/4-	Hardware, home-improvement, craft, or
	inch sticky-back hook-and-loop tape	office supply stores
10	50-cm x 100-cm laminated 1-cm	Available from www.etacuisenaire.com
	grid-paper panels	Item #IN5034, Graph Paper on a Roll,
		1-cm Grid (30" wide x 100' long roll) or
		enough sheets of 1-cm grid graph paper
		to make paper panels of the needed
		dimensions
10	40-inch (approx 100-cm) length 2-	Office supply stores or most grocery
	inch clear packaging tape. Hint: It is	stores.
	helpful to cut these slightly longer so	
	that there will be a slight overlap on	
	each end.	

Tools List

- Drill or drill press
- Drill bit: 3/8-inch or metric equivalent (approx 1.0 cm)
- Small piece of fine-grit to medium-grit sandpaper
- Coping, miter, or table-saw

SAFETY REMINDER

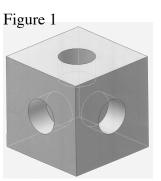
Follow appropriate safety rules for using the drill and saw.



Completed model

Preparation of wooden support pieces and corners of the model

- Using the coping, miter, or table saw, shorten the 12 wooden dowel sticks to 37 7/8-inches (approx 94.8-cm).
- Using the coping, miter, or table saw, cut 8 1-inch cubes from the length of 1-inch poplar square.
- Using the drill with 3/8-inch drill bit, drill 1/4-inch (approx 0.6-cm) deep holes in three sides of each 1-inch wooden cube. The holes should be located on two adjacent sides and the top of each cube. See Figure 1 for location of holes.



Illustrations by Brian Williams

Assembly of sides of the model

- Align two of the laminated panels grid-side up, so that the longer sides of the panels are adjacent without overlapping.
- Using one 40-inch piece of packaging tape, center the tape down the full length of the seam where the two panels meet. **Hint:** This is much easier with two people.
- Turn the taped panels over so that the non-grid side is up, and center another 40-inch length of tape down the full length of the seam.
- Fold any extra tape allowed for overlap to the other side of the panel. This provides a smoother edge.
- Repeat for the other 8 panels, resulting in a total of 5 square panels, 100-cm long and 100-cm wide.

Placement of hook-and-loop strips on square panels

- Select one of the 5 square panels.
- Select two of the 3 1/4-inch strips of hook-and-loop tape. The tape should still be adhered to the protective backing.
- Along one side of the laminated square panel, about 3/8-inch from the edge, (on the non-grid side) adhere one of the looped (fuzzy) pieces of the hook-and-loop tape centering one piece at 25-cm and centering another looped piece at 75-cm.
- Save the remaining hooked (rough) pieces. Do not discard!
- Repeat for the remaining three edges of the laminated square panel.
- Select 4 of the 1-inch hook-and-loop tape pieces. Adhere one looped piece to each of the four corners of the laminated square panel; so that the hook-and-loop tape edge is next to the edges of the laminated corner. Save the remaining hooked pieces. Do not discard!
- Repeat for the remaining four 100-cm x 100-cm laminated square panels.

Placement of hook-and-loop strips on dowel supports and wooden cubes

- Select one of the laminated square panels.
- Select one of the twelve wooden dowels and two of the 1-inch wooden cubes.
- Securely place a wooden cube on each end of the dowel.

- Temporarily place the dowel-and-cube assembly along the edge of the laminated square panel so that the wooden cubes are located at the corner edges of the panel.
- Using a pen or pencil, on the wooden dowel mark the location of the looped side of the hook-and-loop tape.
- Select two of the hooked 3 1/4-inch pieces of hook-and-loop tape.
- Adhere the hooked pieces to the wooden dowel at the marked locations. The hook-and-loop tape does not completely encircle the wooden dowel.
- Adjust if necessary, but the more the hook-and-loop tape is relocated, the less likely it is to securely adhere to the surface. The loop side and hook side should be opposite to allow for adhesion of the laminated square to the wooden dowel.
- Remove the dowel-and-cubes assembly from the laminated square panel.
- Using the dowel as a guide, adhere two pieces of hooked tape to each of the remaining eleven wooden dowels.
- Select another 3 1/4-inch hooked piece of hook-and-loop tape. Adhere these along the gap left by the first pieces of tape so that the tape now covers 3 1/4-inches all the way around the dowel.
- Select three 1-inch looped pieces of tape.
- Select one of the eight wooden cubes.
- Adhere one looped piece of tape to each of the three non-drilled sides of the wooden cube.
- Repeat for the remaining seven cubes.

Assembly of model

- Using the wooden cubes as corners (Figure 2) and the wooden dowels as edge supports, securely join the dowels at the corners to form an open cube Figure 3. **Hint:** It is much easier to do this with two or more people.
- Adhere the laminated square panels to the vertical dowel supports, and across the top, to form a closed cube (see Completed model on page 1). No panel is used on the bottom of the cube. Any remaining hook-and-loop tape can be used to hold panels more securely.

